136. The yarn of claim 118 wherein the crystalline polypropylene homopolymer has a melting point of about 168°C.

137. Carpet having face yarn comprising yarn according to claim 136.

138. The yarn of claim 136 having a Plug Crush Recovery of at least about 87%.

139. The yarn of claim 136 having a Plug Crush Recovery of at least about 90%.

REMARKS

Applicants and the undersigned note with appreciation that the 35 USC 112 and 103 rejections from the preceding Office Action have not been repeated. As a result, the only remaining rejection is for obviousness in view of newly cited US 5,455,305 (Galambos) or US 5,486,419 (Clementini). Reconsideration of the rejection is requested in view of the amendments made herein and the following discussion. An explanation of the new and amended claims and their basis in the description precedes detailed discussion of the rejection.

The Amended and New Claims and Basis Therefor

Independent claims 92 and 105 have been amended to recite that the crystalline homopolymer polypropylene referred to therein melts above about 160°C. Claim 105 also has been amended to delete the recitation related to propylene copolymers and recite that filaments of the yarns consist of a blend of the homopolymer polypropylene with up to about 10 parts by weight other polymer per 100 parts by weight homopolymer polypropylene or such blends with one or more additives. Claim 110 has been amended and new claims

128, 132 and 136 have been added to recite that the melting point of their homopolymer polypropylenes is about 168°C. The remaining amendments to the pending claims provide antecedents properly based on claims 92 and 105 as amended or, in the case of carpet claims such as claims 95, 99 and 101-103, clarify the claims by removing method language. New claims 129-131, 133-135 and 137-139 further define the subject matter of claims 128, 132 and 136, respectively, in a form that follows pending claims such as claims 94-96.

The recitation in claims 92 and 105 with respect to crystalline polypropylene homopolymer melting above about 160°C finds support in the specification's description of preferred polypropylenes of which the filaments of the invented yarns are composed and from which they are made. Referring to page 28 lines 6-12, the invented fibers are described as comprising resinous, crystalline polymers comprising recurring polymerized propylene units. Homopolymer polypropylene is identified as the preferred propylene polymer. Similarly, page 51 lines 25-32 describe propylene polymers preferred for use to make the fibers and yarns as propylene homopolymer, referring specifically to general purpose resins. Page 45 lines 2-3 state that melting point of homopolymer polypropylene is about 168°C, and in the description of a preferred aspect of making yarns according to the invention, heating at a temperature within 20°C of the propylene polymer melting point is described as most preferably conducted at about 150-160°C. It follows, and would be readily understood by persons skilled in the art, that the preferred crystalline homopolymer polypropylene is one that melts above about 160°C, which is the language added by amendment to claims 92 and 105.

The 168°C melting point recitation in amended claim 110 and new claims 128, 132 and 136 is supported at page 45 lines 2-3, noted above.

Support for the recitation in independent claim 105 that blends contain up to about 10 parts by weight other resin per 100 parts by weight crystalline polypropylene homopolymer appears in the paragraph bridging pages 28-29, and particularly at page 28 lines 12-17 stating that amounts of blended polymer or polymers are "such as not to alter the basic and essential nature and characteristics of the invented fibers" and 29 lines 3-7 stating that blends containing no more than about ten parts by weight other polymer per hundred parts propylene polymer are preferred.

Claims 95, 99, 101-103, 109, 113, 121 and 124 all are directed to carpet and have been amended to delete the term "tufted" and refer instead to carpet "having face yarn" comprising yarn according to the respective claims from which they depend. Support is found in the background discussion, for example at page 1 lines 24-31 referring to carpets with face yarn, and at page 40 lines 5 referring to carpets comprising the invented fibers or yarns.

In view of the above, the new and amended claims are adequately supported and do not add new matter.

Discussion of Claim Rejections - 35 USC 103

All pending claims have been rejected as obvious in view of US 5,455,305 (Galambos) or US 5,486,419 (Clementini). The rejection is based on an assertion that the references teach the claimed invention except for bulk level and Plug Crush Recoveries. Reconsideration is requested in view of the amendments made herein and the following discussion.

Both references acknowledge poor resilience of yarns composed of conventional crystalline polypropylene and purport to improve it with alternative propylene polymers. As discussed below, Applicants claims are clearly nonobvious from the references because the claims are for yarns in which the filaments consist essentially of crystalline poypropylene homopolymer of a type expressly taught by both references to be deficient in resiliency of yarns, and which is different from the polymer compositions the references require for their purported improvements. Neither reference makes obvious yarns with filament compositions and resilience properties according to the claims. Rather, they support patentability of the claims with their express teachings of deficient resilience of polypropylenes of the type claimed.

In greater detail, both Galambos' and Clementini's background discussions emphasize deficient resilience of conventional polypropylene carpet yarns. Galambos' background, at Col. 1 lines 17-30, is as follows:

> "In addition to its significant use in structural elements . . . polypropylene has found significant use as a fiber and in yarn, particularly carpet yarn. In order to capitalize on its strength, high melting point, and chemical inertness, as well as low cost, the polymer typically used for such applications has been the isotactic crystalline homopolymer of polypropylene (referred to as 'iPP'). However, carpeting made from this polymer has limited recovery of the pile height after compressive stress (resiliency) and tuft ends which are susceptible to opening up after wear (tuft coherency). Such performance deficiencies have limited its use in domestic Saxony type carpet construction. Earlier attempts to improve isotactic polypropylene homopolymer performance were made by modifying the method of crimping the fibers comprising the yarn, U.S. Pat. No. 3,686,848."

Clementini's background, beginning at Col. 1 line 17, is to like effect, but with further detail concerning resiliency deficiencies (Col. 1 l. 23-32):

> "However, this polymer has limited resilience which detracts from its performance in carpeting. Resiliency is a measure of the ability of a fiber or yarn to recover fully its original dimensions upon release of a stress which is compressing it. In the case of polypropylene carpet the poor resiliency is demonstrated by the 'walking out' of a sculptured carpet in highly trafficked areas or by the matting which occurs on the walked-on areas of level pile carpets. The matting phenomenon also occurs in upholstery which contains polypropylene pile yarn."

As will be appreciated, the deficient resilience of polypropylene carpet yarn discussed in the background of the references is the same problem discussed in the background of the subject application.

The resilience-deficient, crystalline isotactic homopolymer polypropylene referred to in Galambos and Clementini is described further as follows in both (Galambos at Col. 3 lines 1-17; Clementini at Col. 3 lines 46-63):

> "The well-known crystalline polypropylene of commerce is a normally solid, predominantly isotactic, semi-crystalline thermoplastic homopolymer formed by the polymerization of propylene . . . Moreover, the melting point of the normally solid polypropylene of commerce is from about 159-169°C., for example 162°C."

As is readily evident from the above, the resilience-deficient polypropylene described in the references, and which both seek to improve, is a crystalline homopolymer polypropylene melting above about 160°C, as recited in Applicants' claims.

According to Galambos, capabilities for improved yarn properties are provided by blends of the resilience-

deficient polypropylene or its copolymers with so-called syndiotactic polypropylene, one or both of which has been degraded with a free radical generator to increase flow and narrow molecular weight distribution. Galambos' syndiotactic polypropylene is said to be a homopolymer polypropylene but different from conventional polypropylene homopolymer. Among the differences specifically described in the reference is melting behavior. Columns 7 and 8 contrast conventional polypropylene homopolymer's melting point of about 159°C to 169°C with the syndiotactic polypropylene's lower softening temperature and broader thermal response curve (Col. 7 lines 51-57). Differences are seen in greater detail from Example 3, which states as follows:

> "Testing samples in an initial heating cycle two melting peaks are observed, one at a lower temperature for sPP [syndiotactic polypropylene], e.g., 140°-150°C, and one at a higher temperature typical of iPP [conventional isotactic polypropylene], e.g., 162°C. Much of the melting response of the sPP is complete as the temperature rises to the level that causes iPP to begin melting." (Col. 10 line 67 - Col. 11 line 5, emphasis added.)

Thus, not only does Galambos expressly teach that conventional polypropylene homopolymer is deficient in yarn resilience, but the modified polypropylene to which the reference does attribute improvement capabilities is expressly distinguished based on its melting point. Galambos' syndiotactic polypropylene is not a polypropylene that melts above about 160°C.

Beyond the clear differences between Galambos' syndiotactic polypropylene and the homopolymer polypropylene according to Applicants' claims, Galambos

does not teach improvements in yarn properties with blends containing syndiotactic and other polypropylenes from which the claimed yarns can be considered obvious. The blends described by Galambos as providing capability for improvement in resilience of yarns contain greater amounts of syndiotactic polypropylene than admitted by the claims.

Galambos refers broadly to yarns prepared from blends of at least 5 but less than 50 parts of the syndiotactic polypropylene with conventional polypropylene homopolymer or copolymers (Column 2 lines 40-47; Col. 4 lines 27-38). However yarns composed of those blends are described only as "capable of improved properties." (Col. 2 line 40-41; Col. 4 line 27-29). As is well established, description of a material as "capable of" an attribute does not establish realization of the attribute.

To the extent Galambos describes or demonstrates realization of improvements in yarn properties, it is only with respect to yarns with at least 25 parts by weight syndiotactic polypropylene per hundred parts conventional polypropylene. Thus, referring to Example 1 of the reference, blends used for yarns according to all of the examples are described as containing 20-45 parts syndiotactic polypropylene and 80-55 part conventional polypropylene; 20 parts syndiotactic polypropylene with 80 parts conventional polypropylene corresponds to 25 parts of the former per 100 parts of the latter.

Even with those levels of syndiotactic polypropylene, there is little showing in Galambos from which persons skilled in the art might recognize improved resilience of yarns. Among the reference's examples, none presents results of compressional recovery testing of yarns

themselves, and only Example 4 purports to describe resilience testing of carpets made from yarns of syndiotactic polypropylene blended with conventional polypropylene homopolymer, referring to "walk-out" tests (unspecified traffics) with "saxony-type test carpets" (unspecified construction) and evaluation "for appearance retention relating to resiliency, tuft tip retention and soiling." The only "results" reported in the example are that "Compositions of the present invention are superior to 100% iPP of the prior art." The "superiority" is neither quantified, nor is there even an indication that it included resilience.

From the above, it is evident that Galambos' generalized assertions of property improvements and capabilities over a wide range of compositions stand in sharp contrast to the unquantified, and even qualitatively ambiguous, report of capabilities realized even for the limited range of compositions used in its examples.

Accordingly, Galambos does not make obvious the claimed yarns. It expressly describes yarns with filaments of polypropylene homopolymer within Applicants' claims as deficient in resilience, attributes capabilities for improved resilience to a different, lower melting syndiotactic polypropylene, and makes clear that if or to the extent the improvement capabilities are realized, it is not with polypropylene compositions consisting essentially of the higher melting polypropylene homopolymer, or consisting of blends of the homopolymer with up to 10 parts other polymer per 100 parts homopolymer, according to Applicants' claims.

Clementini also discloses yarns "capable of increased resiliency and shrinkage" as compared to yarns of the resilience-deficient conventional polypropylene homopolymer. Capabilities for improvement are attributed to various copolymers, terpolymers and heterophasic thermoplastic elastomeric materials prepared by sequential polymerization of monomers that include propylene, ethylene and/or C_{4-8} olefins (Col 2 line 59 - Col. 3 line 1). Like the syndiotactic polypropylene of Galambos, the co- ter- and heterophase polymers of Clementini, as well as their blends with conventional polypropylene, are described as having a lowered heat softening temperature and broader thermal response curve compared to those of conventional polypropylene homopolymer (Col. 11 lines 27-56; Example 6).

As discussed above, the conventional polypropylene homopolymer expressly taught by Clementini to be deficient in yarn resilience is a homopolymer according to Applicants' claims. The co- ter- and heterophase polymers to which Clementini does attribute capabilities for property improvement are not even homopolymer polypropylenes, much less homopolymer polypropylenes melting above about 160°.

Blends of Clementini's co- and ter- and heterophase polymers with each other or with crystalline polypropylene homopolymer also are disclosed in the reference; however blends with homopolymer said to provide improvements in yarn resilience contain greater amounts of the co-, ter- and heterophase polymers than admitted by Applicants' claims. Thus, while yarns "capable of increased resiliency and shrinkage" are noted in Clementini's general description (Col. 2 lines 59-64), the reference's

enumeration of particular compositions and improvements or capabilities attributable thereto at Col. 3 lines 2-26 refers to resiliency improvements only for blends with conventional homopolymer polypropylene in which the content of co-, ter- or heterophase polymer is 30 wt.% or greater. Thus, as described at Col. 3 lines 21-26,

> "A further, preferred, embodiment of this invention comprises polyolefin yarn of increased resiliency and shrinkage produced from blends of propylene polymer material [co-/ter-/heterophase polymer] with up to 70 weight percent crystalline polypropylene homopolymer."

In this regard, Clementini's claims are expressly limited to blends in which crystalline polypropylene homopolymer content is at most 70% and Examples 1-3 and 5 show generally increasing improvements in carpet appearance, twist retention and thickness retention for yarns prepared with increasing content of a propylene/ethylene/butene-1 terpolymer blended with polypropylene homopolymer in proportions of 0/100, 15/85, 30/70 and 50/50 wt.%. (Curiously, and without explaining or acknowledging inconsistency with its own recognition that commercial polypropylene carpet yarns have been regarded as intermediate in resilience between polyester and nylon (Col. 1 lines 47-53), Example 1 shows thickness retention after Hexapod testing at 8000 cycles as best for polyester, surpassing not only nylon and homopolymer polypropylene yarns but also all of the reference's blends).

In those of Clementini's blends of co-, ter- or heterophase polymer with conventional homopolymer polypropylene said to provide resiliency improvements in yarns, Clementini's minimum of 30 wt.% co-, ter- or heterophase polymer corresponds to about 40 parts per 100

parts polypropylene homopolymer. Homopolymer polypropylene blends with such levels of the other polymers do not make obvious yarns with filaments consisting essentially of homopolymer polypropylene melting above about 160° or such a homopolymer with additives as recited in the claims, or yarns with filaments consisting of blends of such a homopolymer with up to 10 parts other resin per hundred parts of the homopolymer or additive-containing blends as recited in Applicants' claims.

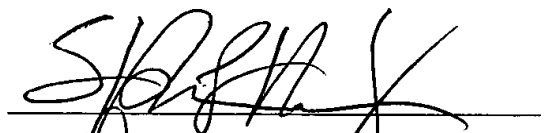
Accordingly, Clementini does not make obvious the claimed yarns. Like Galambos, it expressly describes yarns with filaments of polypropylene homopolymer within Applicants' claims as deficient in resilience, attributes capabilities for improvement to different polymers - its co-, ter- and heterophase polymer compositions -- with lower melting behavior, and expressly links improvements in resilience of yarns to presence of at least 30 wt% of such compositions, as opposed to compositions consisting essentially of the polypropylene homopolymer or consisting of blends thereof with up to 10 parts other polymer per 100 parts polypropylene and their additive-containing compositions according to Applicants' claims.

In view of the amendments made herein and the foregoing discussion, it is clear that neither Galambos nor Clementini "teach[es] the presently claimed invention with the exception of (a) the bulk level and (b) the PCR values" as asserted in the outstanding action. Even without the differences discussed above, the Examiner's admitted assumption that Plug Crush Recoveries would be met by the references ignores the references' own distinctions between "capabilities" for improvement and their realization, as

well as the fact that neither reference even describes or exemplifies any compressional recovery testing of yarns themselves, relying instead on carpet tests. In any event, given the clear differences in composition of the claimed yarns and those of the references, the outstanding action's assumptions are clearly unsupported and the claims are clearly nonobvious from the references. Both references, assigned on their face to polypropylene producer Montell, reflect attempted polymer modifications to improve resilience of polypropylene yarns of the type noted at pages 2 and 14 of Applicants' specification. Both references, with their express teachings of resilience deficiencies of polypropylene yarns, are yet additional examples of the longstanding but unsuccessful search for polypropylene yarns with improved resilience. As such and given the foregoing discussion, Galambos and Clementini support, rather than detract from, patentability of the claimed yarns.

In view of the amendments made herein and the foregoing remarks, it is submitted that the subject application is in condition for allowance and such action is respectfully requested.

Respectfully submitted,



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Amended and New Claims (additions to pending claims are underlined and deletions therefrom are bracketed)

92. (amended) Bulked continuous filament yarn consisting essentially of substantially continuous filaments and having a bulk level of about 2 to about 20%, denier of about 500 to about 3000, shrinkage of about 1 to about 15% and Plug Crush Recovery of at least 85%, wherein the filaments consist essentially of crystalline polypropylene homopolymer that melts above about 160°C or such crystalline polypropylene homopolymer having incorporated therein at least one additive that is a pigment, process aid, flame retardant, heat stabilizer, light stabilizer, antimicrobial agent, electrically conductive material, antistatic agent or stain resisting agent.

93. (amended) The yarn of claim 92 wherein the filaments consist essentially of the crystalline polypropylene homopolymer having incorporated therein at least one additive that is a pigment, process aid, flame retardant, heat stabilizer, light stabilizer, antimicrobial agent, electrically conductive material, antistatic agent or stain resisting agent.

95. (amended) Carpet [tufted with] having face yarn comprising yarn according to claim 94.

97. (amended) The yarn of claim 92 wherein the filaments consist essentially of the crystalline polypropylene homopolymer.

99. (amended) Carpet [tufted with] having face yarn comprising yarn according to claim 98.

101. (amended) Carpet [tufted with] having face yarn comprising yarn according to claim 92.

102.(amended) The carpet of claim 101 [wherein the tufts are] having a cut pile [tufts].

103.(amended) The carpet of claim 101 [wherein the tufts are] having a loop pile [tufts].

105.(amended) Bulked continuous filament yarn consisting essentially of substantially continuous filaments and having a bulk level of about 2 to about 20%, denier of about 500 to about 3000, shrinkage of about 1 to about 15% and Plug Crush Recovery of at least 85%, wherein the filaments consist [essentially] of [a propylene polymer that is at least one homopolymer polypropylene or copolymer of propylene and at least one copolymerizable monomer, or of] a blend of [said propylene polymer] crystalline polypropylene homopolymer that melts above about 160°C with up to 10 parts by weight per 100 parts by weight of the crystalline polypropylene homopolymer of at least one other polymer, or [of said propylene polymer or] the blend having incorporated therein at least one additive that is a pigment, process aid, flame retardant, heat stabilizer, light stabilizer, antimicrobial agent, electrically conductive material, antistatic agent or stain resisting agent.

106. (amended) The yarn of claim 105 wherein the filaments consist [essentially] of the blend [a copolymer of propylene and at least one compolymerizable monomer in which the amount of polymerized comonomer units is up to about 10 parts by weight per 100 parts by weight of the polymerized propylene units].

109.(amended) Carpet [tufted with] having face yarn comprising yarn according to claim 106.

110.(amended) The yarn of claim 106 wherein the crystalline polypropylene homopolymer has a melting point

of about 168°C [the filaments consist essentially of said copolymer having incorporated therein at least one additive that is a pigment, process aid, flame retardant, heat stabilizer, light stabilizer, antimicrobial agent, electrically conductive material, antistatic agent or stain resisting agent].

113.(amended) Carpet [tufted with] having face yarn comprising yarn according to claim 110.

118. (amended) The yarn of claim [114] 105 wherein the filaments consist [essentially] of said blend having incorporated therein at least one additive that is a pigment, process aid, flame retardant, heat stabilizer, light stabilizer, antimicrobial agent, electrically conductive material, antistatic agent or stain resisting agent.

121.(amended) Carpet [tufted with] having face yarn comprising yarn according to claim 118.

124.(amended) Carpet [tufted with] having face yarn comprising yarn according to claim 123.

128.(new) The yarn of claim 93 wherein the crystalline polypropylene homopolymer has a melting point of about 168°C.

129.(new) Carpet having face yarn comprising yarn according to claim 128.

130.(new) The yarn of claim 128 having a Plug Crush Recovery of at least about 87%.

131.(new) The yarn of claim 128 having a Plug Crush Recovery of at least about 90%.

132.(new) The yarn of claim 97 wherein the crystalline polypropylene homopolymer has a melting point of about 168°C.

133.(new) Carpet having face yarn comprising yarn according to claim 132.

134.(new) The yarn of claim 132 having a Plug Crush Recovery of at least about 87%.

135.(new) The yarn of claim 132 having a Plug Crush Recovery of at least about 90%.

136.(new) The yarn of claim 118 wherein the crystalline polypropylene homopolymer has a melting point of about 168°C.

137.(new) Carpet having face yarn comprising yarn according to claim 136.

138.(new) The yarn of claim 136 having a Plug Crush Recovery of at least about 87%.

139.(new) The yarn of claim 136 having a Plug Crush Recovery of at least about 90%.